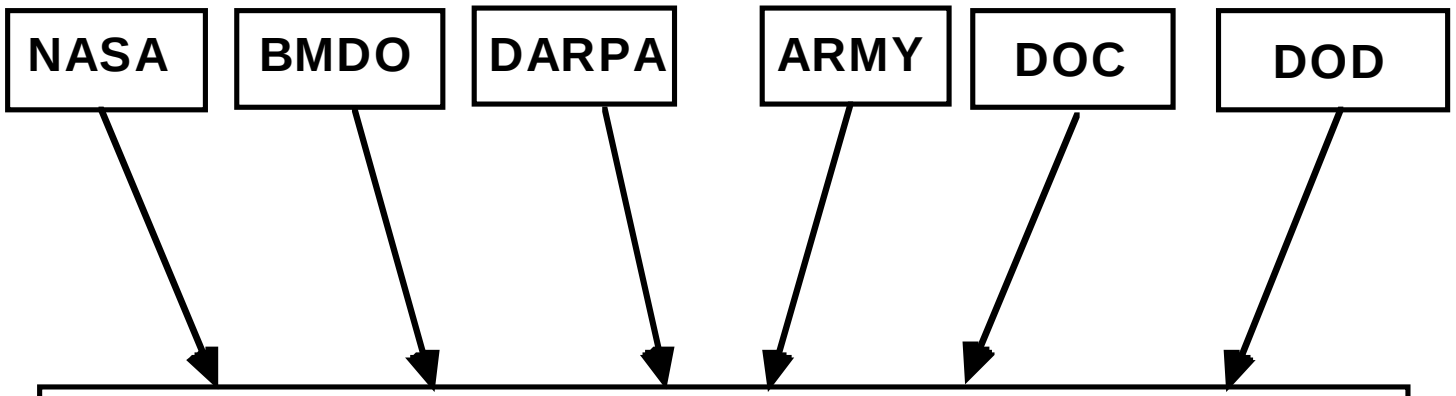
Center for Space Microelectronics Technology

Benefits of CSMT



CSMT

- **CRITICAL MASS PROGRAM**
  - **STAFF**
  - **FACILITIES**
  - **EQUIPMENT**
- **COMMON TECHNOLOGY DEVELOPMENT**
- **MINIMUM COST TO THE GOVERNMENT**
- **MAXIMUM LEVERAGE FOR U.S. INDUSTRY**

Center for Space Microelectronics Technology

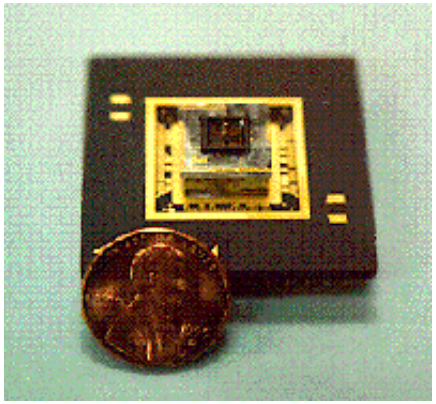
Board of Governors

- **PROVIDES POLICY GUIDANCE AND PROGRAM OVERSIGHT**

  - **DR. EDWARD STONE, DIRECTOR, JPL, CHAIRMAN**
  - **DR. THOMAS EVERHART, PRESIDENT, CALTECH**
  - **DR. DWIGHT DUSTON, ASSISTANT DEPUTY FOR TECHNOLOGY, BALLISTIC MISSILE DEFENSE ORGANIZATION**
  - **DR. MARY GOOD, UNDERSECRETARY FOR TECHNOLOGY, DEPARTMENT OF COMMERCE**
  - **DR. WESLEY HUNTRESS, ASSOCIATE ADMINISTRATOR, NASA/OFFICE OF SPACE SCIENCE**
  - **DR. STEVEN KOONIN, VICE PRESIDENT AND PROVOST, CALTECH**
  - **MR. LARRY LYNN, DIRECTOR, DEFENSE ADVANCED RESEARCH PROJECTS AGENCY**
  - **DR. JOHN LYONS, DIRECTOR, U.S. ARMY RESEARCH LABORATORY**
  - **MR. SAMUEL VENNERI, NASA CHIEF TECHNOLOGIST**

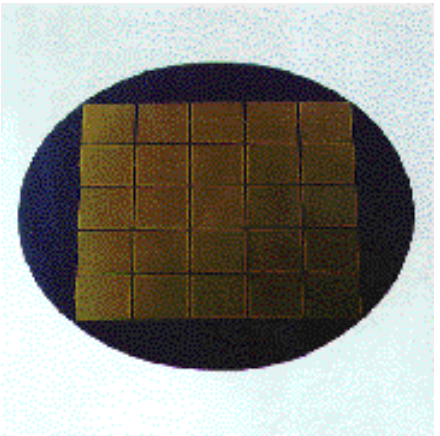
Center for Space Microelectronics Technology

Microsensors/Microinstruments



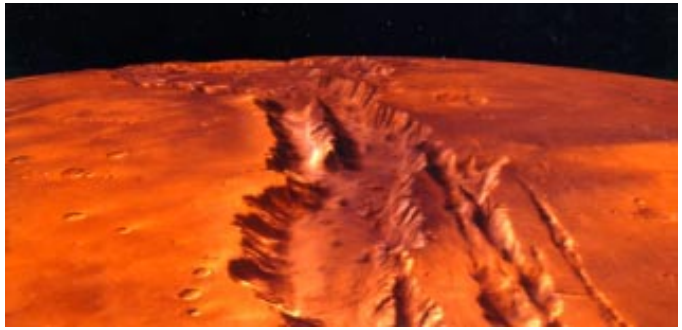
Micro-Gyro

Detectors



Twenty Five 256 x 256 QWIP Focal PlaneArrays (FPAs) on 3 inch GaAs Wafer

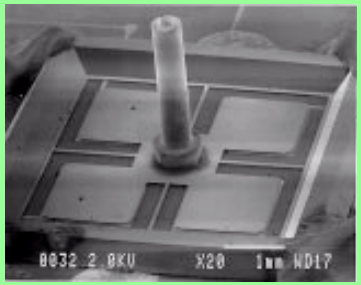
High Performance Computing and Networking



Three-dimensional visualization of Viking image of Mars (five times exaggeration)

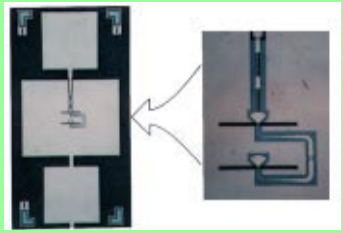
Microdevices Laboratory (MDL)

Microinstruments and MEMS devices

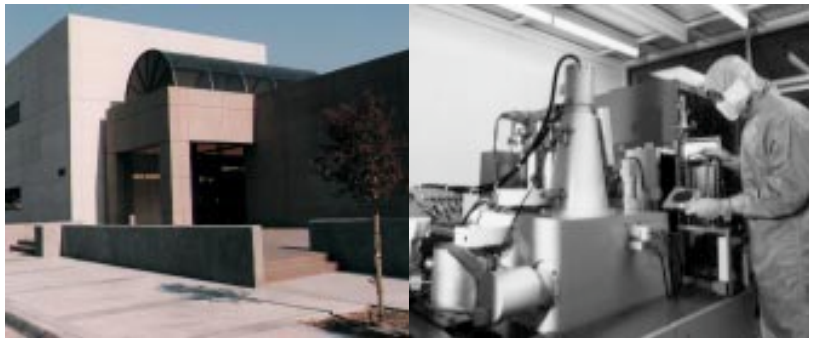


- Surface/Bulk micromachining
- Invention of tunnel transducer technology
- Microinstruments including
  - μ–σεισμομετερ
  - ∞ μιχρογψροσχοπε
  - ∞ μ–ωεατηερ στατιον
  - ∞ μ–αχχελερομετερ

Superconducting Devices



- Mixer arrays for sub-mm astronomy and atmospheric chemistry - SIS and hot electron bolometer mixers
- FIR bolometers
- Lo-Tc and hi-Tc materials



The Microdevices Laboratory (MDL) is a state of the art facility focused on creating the building blocks enabling NASA's vision of smaller, faster, cheaper spacecraft

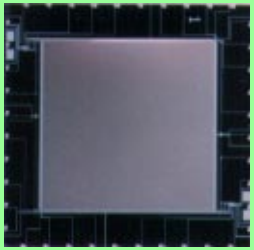
<u>MDL Facilities include:</u> Class 10 cleanroom; E-beam and optical lithography; MBE, MOCVD, LPCVD growth systems; RIE systems; and full processing and characterization capabilities

For more information: http://mishkin.jpl.nasa.gov

Neural Network Processors

- Autonomous control
- High speed processing
- Pattern recognition

IR Focal Plane Array UV & X-Ray CCD



- (QWIP) Quantum well IR photodetector arrays based on GaAs/AlGaAs MBE structures
- Enhanced UV / X-ray CCDs via MBE δ–δοπινγ
  ∞ ΓαΝ γροωτη & δεϖιχεσ

Semiconductor Lasers

- Narrow linewidth, 300K tunable diode lasers
- InGaAsP lasers to 2.0 μμ φορ σπεχτροσχοπψ
  ∞ Λασερ αρραψσ φορ ηιγη ρατε χομμ (10Πσ Γβ/σεχ)

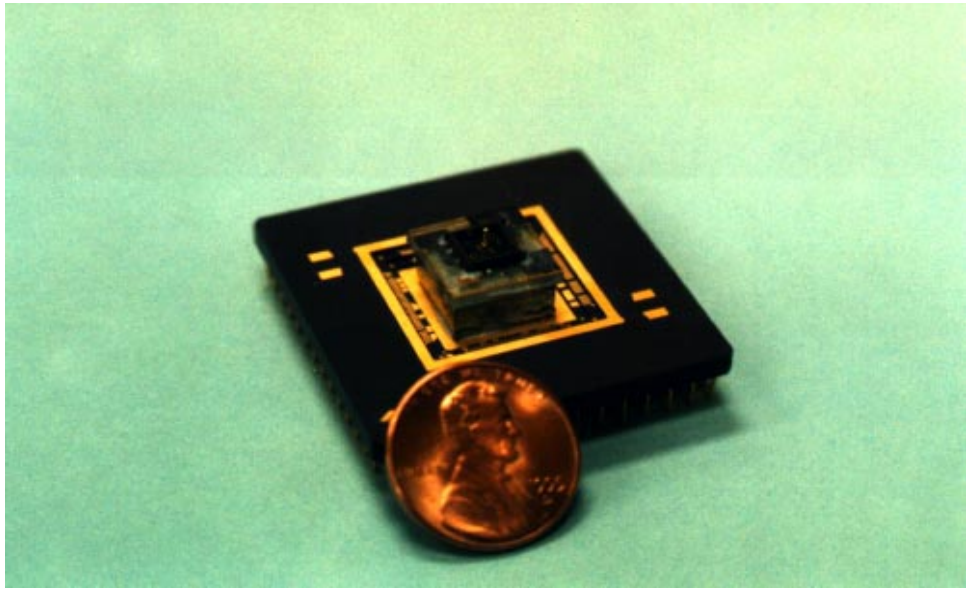
PALMCORDER SIZE QWIP CAMERA

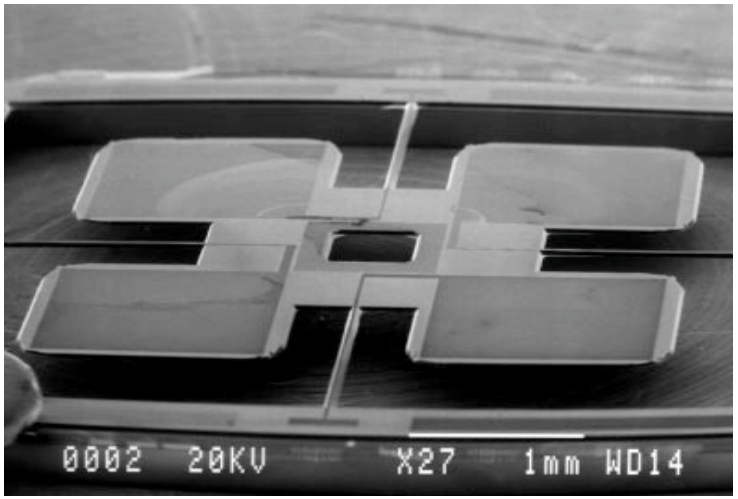
Low Cost Camera for Scientific, Defense, and Commercial Applications

Detector Technology	=	QWIP
Focal Plane Array Size	=	256 x 256
Spectral Bandpass	=	8 - 9 μm
Optics	=	f1.3 Ge
Output	=	Standard Video-analog
Power Requirements	=	5.5 Watts
Battery Life	=	More than 2 hours from standard camcorder battery
Weight	=	2.5 pounds
Dimensions (with 50 mm lens)	=	5.3 in. x 9.7 in. x 2.5 in.
NeΔt	=	30 - 50 mK

JPL

Micromachined Vibratory Microgyroscope

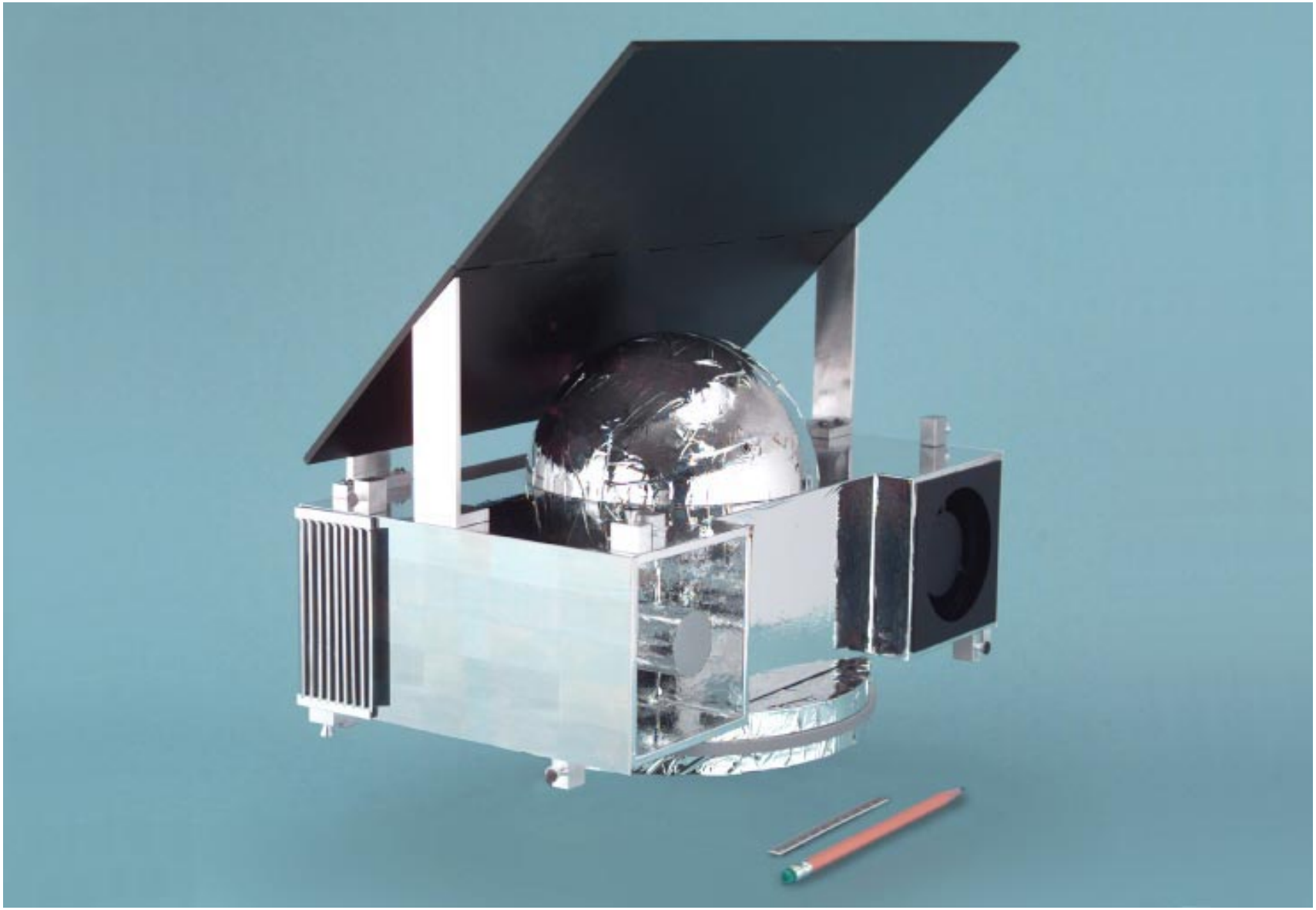




SEM picture of the Si micromechanical gyroscope.

JPL

Near-Earth-Object Rendezvous Second-Generation Microspacecraft full-scale model



Center for Space Microelectronics Technology

CSMT ACTIVITIES

- **INNOVATION**
- **APPLIED RESEARCH**
- **TECHNOLOGY DEVELOPMENT**
- **RAPID PROTOTYPING**
- **TECHNOLOGY DEMONSTRATION AND VALIDATION**
- **TECHNOLOGY INSERTION INTO MISSIONS**
- **TECHNOLOGY TRANSFER AND COMMERCIALIZATION**

Center for Space Microelectronics Technology

(Cumulative Since 1987)

COLLABORATIONS:

UNIVERSITY	**74**
CALTECH FACULTY / STAFF	**54**
INDUSTRY	**90**

CONFERENCES AND WORKSHOPS HOSTED / SPONSORED: **75**

DISTINGUISHED VISITING SCIENTISTS: **46**